

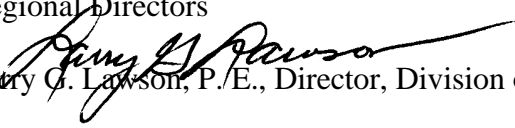
MEMORANDUM

DIVISION OF WATER PROGRAM COORDINATION

Office of Water Quality Programs
Water Quality Standards and Biological Programs

SUBJECT: Guidance Memo No. 02-2004
Targeted Lake & Reservoir Monitoring

TO: Regional Directors

FROM:  Larry G. Lawson, P.E., Director, Division of Water Program Coordination

DATE: April 8, 2002

COPIES: Environmental Field Managers, Regional Biologists, Alan Pollock, Jean Gregory, Alex Barron, Gabriel Darkwah, Rick Browder and Jon VanSoestbergen

PURPOSE

This document is intended to provide revised guidance to DEQ regional offices for monitoring lakes and reservoirs in Virginia. This guidance replaces the March 5, 2001 Guidance Memo No. 01-2004.

The primary changes in the guidance are updates to Tables 1 and 2 and Appendix A. The significant lakes list in Appendix A was modified by the deletion and addition of some lakes to the list for the Tidewater Region and by the transfer of several lakes from the Piedmont Region to their proper assignment within the recently created South Central Region. Parameter codes were revised in Table 2 to reflect current minimum sampling requirements. Table 1 and the related text under "Parameter Selection for Lab Analysis" were revised to better define sampling depths for dissolved oxygen, fecal coliform bacteria and chlorophyll a and to clarify that sediment samples should be sampled only once during the collection year. Notations were added to both Tables 1 and 2 to indicate the need to transition from fecal coliform bacteria to E. coli after the effective date of the pending Water Quality Standards bacterial indicators amendment. Additional text was added to the first paragraph of the "Parameter Selection for Lab Analysis" section to emphasize that regional offices may elect to increase the sample parameter coverage beyond the minimum requirements provided in the guidance.

Although agency staff monitors both lakes and reservoirs, this program is commonly referred to as the lake monitoring program and that convention will be used throughout this guidance document.

A joint central and regional office subcommittee of the agency former Water Quality Monitoring Strategy Task Force developed the guidance issued in 2001. Their goal was to redesign the lake monitoring program to increase the frequency of monitoring for significant lakes to better meet agency data assessment needs.

That approach allowed the regional offices to more effectively allocate existing lake monitoring resources and at the same time provide the data for various identified agency assessment needs, such as:

- Section 305(b) reports,
- Section 303(d) lists,

- local citizen concerns,
- determinations whether the water quality is sufficient to maintain existing uses,
- determination of potential nutrient enriched waters designations,
- development of state specific numerical nutrient criteria for Virginia lakes, and
- updates to a priority ranking list of publicly owned lakes eligible for restoration grant funds under the Environmental Protection Agency's Clean lakes program (Section 314 of the Clean Water Act).

Although the lake information gathered via monitoring may be used for the various assessment goals described above, this document does not address data analysis and assessment. Rather, this guidance is restricted to pre-monitoring and monitoring aspects of the program, i.e. lake selection, station siting, frequency of sampling, field sampling and parametric coverage.

BACKGROUND

Need for Revision: Revisions to the monitoring program were needed because the previous five year monitoring rotation schedule generated a single monitoring data collection for an individual lake once every five years. Such a monitoring approach resulted in assessments of individual lakes based on one sampling event; however, recent changes in 305(b) reporting and the 303(d) listing process now require DEQ to make assessments of individual lakes with a higher degree of confidence. This can be achieved with more frequent data collection. The revised plan focuses staff resources on more frequent sampling of high priority significant lakes in order to have sufficient data to produce highly accurate and reliable assessments.

Programmatic Responsibility: Program administration will continue from the central office Water Quality Standards and Biological Programs (WQS&BP) unit with implementation by the seven DEQ regional offices. However, one significant change is the recognition that lake and reservoir monitoring is viewed as a subset of other ambient surface water quality monitoring. In other words, lake monitoring is viewed as part of the overall agency ambient water quality monitoring effort.

LAKE SELECTION

Source List of Lakes: An updated version of the May 2000 public noticed list of significant lakes serves as the source of lakes for prioritization and selection for monitoring by DEQ. This master list is attached as **Appendix A**. A significant lake is defined as:

All publicly accessible lakes which are either public water supplies or 100 acres or more in size.

This definition includes the federally owned lakes that meet these criteria, but all other federally owned lakes should be excluded from the agency lake monitoring program.

Periodic Updates to the List: It is the responsibility of each region to periodically (at least once every two years) update the master list by deleting lakes which have been drained or converted to private ownership and adding newly constructed lakes and reservoirs.

Prioritization for Monitoring: All lakes must be publicly accessible to be considered for monitoring resources. The uses and impairment prioritization matrix in **Appendix B** of this document is intended as a uniform way for each region to rank lakes within the regional boundaries for monitoring. After the lakes are prioritized, each region will determine how many lakes they have resources to monitor in any given year.

Documentation of Alternative Basis for Selection for Monitoring: The prioritization matrix is a starting point for prioritizing lakes in need of monitoring but it is not intended to prevent a region from using a different approach if required by a unique circumstance. If a region decides to not use the results of the matrix, regional staff should document the rationale for the deviations and describe the alternative approach used to prioritize lakes for monitoring.

SAMPLING SITE SELECTION

Location: The sampling location(s) in each lake are determined by the lake morphometry. In lakes that are almost round in shape, one station located in the deepest part of the lake (usually the center of the lake) is considered adequate. Since this single sampling station should be representative of the overall lake water quality, it should not be located near a dam, close to shore, or near stream inflows or point source influents. In lakes with distinctive subbasins, coves, fingers or multiple inlets where significant water quality differences might exist, additional sampling sites may be required. Latitude and longitude descriptors identify all monitoring sites.

Sampling Method: In-lake samples should be collected from an anchored boat with either a water bottle sampler or pump and hose.

Sample Collection in Lakes: At a minimum samples are collected at 0.3 meter below the surface. Additional sampling depths are optional.

Sampling Frequency: The minimum sampling frequency for each lake is once monthly from April through October for the calendar year. This will result in a total of seven sampling events in each lake over one year. If resources are available, regional offices may elect to monitor their high priority lakes on an annual basis or other rotational interval. Such increased monitoring may be warranted in situations such as high recreational usage, shoreline development, or citizen concerns.

Lakes Monitoring Rotation: The window for data assessment is five years. Thus individual high priority lakes will be monitored on a five year rotation, i.e. one fifth of the lakes will be monitored the first year, then the next fifth will be monitored the second year, etc. The rotation will begin again in the sixth year.

PARAMETER SELECTION FOR LAB ANALYSIS

Minimum parameter lists and monitoring frequency is identified by lake monitoring assessment goal (**Table one**). Regional offices may elect to have the laboratory analyze samples for additional parameters to meet other regional needs. For example, some regional offices with significant VPDES discharges to a lake might elect to run biochemical oxygen demand and suspended solids.

For 305(b) assessment purposes, the minimum parameter list is dissolved oxygen, pH, temperature, fecal coliform bacteria, conductivity and salinity (where appropriate). At a minimum, samples should be collected in the epilimnion or at a depth of 0.3 meter if the lake is unstratified.

To determine trophic status or potential need for regulatory designation as a nutrient enriched water, the following parameters need to be collected: alkalinity, hardness, secchi disk depth, chlorophyll *a*, dissolved oxygen/temperature depth profile, total nitrogen, total phosphorus and ortho phosphorus. Data collection should, as a minimum, occur during the active algal growth season that is usually the late summer months.

The minimum parametric coverage for toxicity assessment is: ammonia, pesticide/herbicide scan in sediments, and metals scan in sediments. Sediment samples should only be collected once per year at one station in the main stem of the lake.

Table two lists lake monitoring parameter group codes for samples submitted to the state laboratory (DCLS) for analysis.

FIELD MEASUREMENTS

Field measurements at each sampling station should include a temperature and dissolved oxygen profile with measurements taken at intervals of one meter (using a combined temperature- dissolved oxygen meter). Field measurements should also include pH, conductivity, and Secchi depth.

All of these field measures – including the dissolved oxygen/temperature depth profile data - should be entered into the WQM database.

Records of field observations are also useful and can prove to be helpful later when assessing the data results. For example, do not rely on chlorophyll a data if algicides were applied near the time of sampling.

DATA REPORTING RESPONSIBILITIES

It is the responsibility of the regional lake monitoring team to provide the 305(b) regional planners with an electronic version of the WQM data. Once the lake monitoring team and planners consult and reach agreement on the reliability and meaning of the data, it is the responsibility of the planner to retrieve and enter the data into the Assessment Database (ADB) for use in 305(b) report.

OPTIONAL QUESTIONS FOR LOWER PRIORITY LAKES

Since the emphasis of this revised guidance is on using existing resources to sample and assess the high priority lakes, the lower priority lakes will likely go unmonitored. In such situations, one potential option for the regional office is to utilize questionnaires or desk top screening assessment tools to obtain use and impairment data from the lake owner, lake monitoring volunteer, public water supply manager, or others with knowledge of a particular lake.

CONTACT

If you have any questions on this guidance document, please feel free to contact Jean Gregory at (804) 698-4113.

DISCLAIMER

This document provides procedural guidance to staff. This document is guidance only. It does not establish or affect legal rights or obligations. It does not establish a binding norm and is not finally determinative of issues addressed. Agency decisions in any particular case will be made by applying the State Water Control Law and the implementation regulations on the basis of the site-specific facts.

Table 1. Minimum Parameter List by Type of Assessment

305(b):

- Dissolved Oxygen (Epilimnion if stratified or 0.3 meter below surface if unstratified)
- pH
- Temperature
- Fecal Coliform Bacteria* (0.3 meter below surface)
- Conductivity
- Salinity (where appropriate)

Trophic State/Nutrient Enrichment:

- Alkalinity
- Hardness
- Secchi Disk Depth
- Chlorophyll a (0.3 meter below surface)
- Dissolved Oxygen/Temperature Depth Profile
- Total Phosphorus
- Ortho Phosphorus
- Total Nitrogen Series

Toxicity Assessment:

- Ammonia Concentrations in water
- Pesticide/Herbicide Scan In Sediments (collected once during the sampling year)
- Metals Scan In Sediments (collected once during the sampling year)

* transition to E. coli after effective date of Water Quality Standards bacterial indicators amendment

Table 2. Lake Monitoring Parameter Group Codes for Samples Submitted to DCLS For Analysis

- **Field** DO, pH, Conductivity, Temperature
- **INUTL** Ammonia, TKN, TP (0.01) which is low range and needs to be preserved
- **NUT4** NO₂, NO₃, OP
- **FCMF** Fecal Coliform *
- **FCHLR** Chlorophyll a
- **HTIT** Hardness
- **MET1S** Metals in Sediment
- **PES1S** Pesticides in Sediment

* transition to E. coli after effective date of Water Quality Standards bacterial indicators amendment

APPENDIX A

SIGNIFICANT LAKES BY REGION

Northern Regional Office – 13 Lakes

Able Lake	Stafford Co.	185 (Acres)	PWS (Public Water Supply)
Lake Anna	Louisa Co.	12998	
Aquia Reservoir (Smith Lake)	Stafford Co.	219	PWS
Beaverdam Reservoir	Loudoun Co.	350	PWS
Burke Lake	Fairfax Co., VDGIF	218	
Goose Creek Reservoir	Loudoun Co.	140	PWS
Lake Manassas	Pr. William Co.	741	PWS
Motts Run Reservoir	Spotsylvania Co.	160	PWS
Mountain Run Lake	Culpeper Co.	75	PWS
Ni Reservoir	Spotsylvania Co.	400	PWS
Northeast Creek Res.	Louisa Co.	49	PWS
Ocoquan Reservoir	Fairfax Co.	1700	PWS
Pelham Lake	Culpeper Co.	253	PWS

Piedmont Regional Office - 11 Lakes

Airfield Pond	Sussex Co., VDGIF	105	
Amelia Lake	Amelia Co., VDGIF	110	
Brunswick Lake	Brunswick Co., VDGIF	150	
Lake Chesdin	Chesterfield Co.	3196	PWS
Chickahominy Lake	Charles City Co.	1500	PWS
Diascund Reservoir	New Kent co.	1700	PWS
Emporia Lake	Greensville Co.	210	PWS
Falling Creek Reservoir	Chesterfield Co.	110	
Great Creek Reservoir	Lawrenceville	305	
Swift Creek Lake	Chesterfield Co.	156	
Swift Creek Reservoir	Chesterfield Co.	1800	PWS

South Central Regional Office – 23 Lakes

Briery Creek Lake	Pr. Edward Co., VDGIF	850	
Brookneal Reservoir	Campbell Co.	25	PWS
Cherrystone Lake	Pittsylvania Co.	105	PWS
Crystal Lake	Nottoway Co.	65	PWS
Fort Pickett Reservoir	Nottoway Co.	384	PWS
Lake Gaston	Brunswick Co.	20300	PWS
Georges Creek Res.	Pittsylvania Co.	1	PWS
Gordon Lake	Mecklenburg Co., VDGIF	157	
Graham Creek Res.	Amherst Co.	50	PWS
Halifax Reservoir (Bannister Lake)	Halifax Co.	410	PWS
Holiday Lake	Appomattox Co.	145	
Kerr Reservoir	Halifax Co., ACOE	48968	PWS
Keysville Lake	Charlotte Co.	42	PWS
Lake Conner	Halifax Co., VDGIF	111	
Lunenburg Beach Lake	Town of Victoria	13	PWS
Modest Creek Reservoir	Town of Victoria	29	PWS
Nottoway Falls Lake	Lunenburg Co.	60	PWS
Nottoway Lake	Nottoway Co.	188	
Pedlar Lake	Amherst Co.	75	PWS
Roaring Fork	Pittsylvania Co.	19	PWS
Stonehouse Creek Res.	Amherst Co.	125	
Thrashers Creek Res.	Amherst Co.	110	
Troublesome Creek Res. (SCS Impoundment #2)	Buckingham Co.	58	PWS

South West Regional Office – 9 Lakes

Appalachia Res.	Wise Co.	17	PWS
Big Cherry Lake	Wise Co.	76	PWS
Byllsby Reservoir	Carroll Co.	335	
J. W. Flannigan Res.	Dickenson Co., ACOE	1143	PWS
Hungry Mother Lake	Smyth Co.	108	PWS
Lake Keokee	Lee Co., VDGIF	100	
Laurel Bed Lake	Russell Co., VDGIF	300	
North Fork Pound Res.	Wise Co., ACOE	154	PWS
South Holston Res.	Washington Co., TVA	7580	PWS

Tidewater Regional Office – 17 Lakes

Lake Cahoon	Suffolk City	508	PWS
Lake Burnt Mills	Isle of Wight Co.	610	PWS
Harwood Mill Pound	York Co.	300	PWS
Lake Kilby	Suffolk City	226	PWS
Lee Hall Reservoir	Newport News	230	PWS
Little Creek Res.	Norfolk City	185	PWS
Little Creek Res.	James City Co.	860	PWS
Lone Star Lake F	Suffolk City	20	PWS
Lone Star Lake G	Suffolk City	50	PWS
Lone Star Lake I	Suffolk City	39	PWS
Lake Meade	Suffolk City	511	PWS
Lake Prince	Suffolk City	775	PWS
Lake Smith	Norfolk City	222	PWS
Speights Run Lake	Suffolk City	94	PWS
Waller Mill Res.	York Co.	315	PWS
Western Branch Res.	Suffolk City	1,600	PWS
Lake Whitehurst	Norfolk City	458	PWS

Valley Regional Office – 12 Lakes

Beaver Creek Res.	Albemarle Co.	104	PWS
Mount Jackson Res.	Shenandoah Co.	0.7	PWS
Coles Run Res.	Augusta Co., USFS	9	PWS
Elkhorn Lake	Augusta Co., USFS	55	PWS
Lake Frederick	Frederick Co., VDGIF	120	
Ragged Mount Res.	Albemarle Co.	54	PWS
Rivanna Res.	Albemarle Co.	390	PWS
Staunton Dam lake	Augusta Co.	30	PWS
Strasburg Reservoir	Shenandoah Co.	5.3	PWS
Switzer Lake	Rockingham Co., USFS	110	
Sugar Hollow Res.	Albemarle Co.	47	PWS
Totter Creek Res.	Albemarle Co.	66	PWS

West Central Regional Office – 15 Lakes

Beaverdam Creek Res.	Bedford Co.	123	PWS
Bedford Reservoir	Bedford Co.	28	PWS
Carvin Cove Reservoir	Botetourt Co.	630	PWS
Claytor Lake	Pulaski Co.	4483	PWS
Clifton Forge Res.	Alleghany Co., USFS	16	PWS
Fairystone Lake	Henry Co.	168	
Gatewood Res.	Pulaski Co.	162	
Hogan Lake	Pulaski Co.	40	PWS
Leesville Res.	Bedford Co.	3400	PWS
Little River Res.	Montgomery Co.	113	
Martinsville Res.	Henry	220	PWS

West Central Regional Office (continued)

Lake Moomaw	Bath Co., USFS	2430	
Philpott Res.	Henry Co., ACOE2879		
Smith Mountain Lake	Bedford Co.	19992	PWS
Talbott Reservoir	Patrick Co.	165	

Total 100 Lakes Statewide

APPENDIX B

LAKES PRIORITIZATION
DRAFT RANKING PROCEDURE

	RESOURCE VALUE IMPORTANCE	DEGREE of USE IMPAIRMENT	PROBLEM ID STATUS	PROBABILITY to CONTROL PROBLEM	URGENCY to ADDRESS PROBLEM	TOTALS
PUBLIC WATER SUPPLY	5 x = A.1.	5 x = A.2.	2 x = A.3.	2 x = A.4.	5 x = A.5.	
HUMAN CONSUMPTION FISH/BIOTA	5 x = B.1.	2 x = B.2.	2 x = B.3.	2 x = B.4.	5 x = B.5.	
PRIMARY CONTACT (Swimming)	2 x = C.1.	2 x = C.2.	2 x = C.3.	2 x = C.4.	5 x = C.5.	
AQUATIC LIFE PROTECTION	2 x = D.1.	2 x = D.2.	2 x = D.3.	2 x = D.4.	2 x = D.5.	
BOATING/ RECREATION ACTIVITY	1 x = E.1.	1 x = E.2.	1 x = E.3.	1 x = E.4.	1 x = E.5.	
					PRIORITY TOTAL =	

RANKING MULTIPLIER EXPLANATIONS

PUBLIC WATER SUPPLY

A.1. : PUBLIC WATER SUPPLY - RESOURCE VALUE IMPORTANCE

- 0 = NOT APPLICABLE, No public water supply use.
- 1 = <10% of total supply and no other supplies impacted.
- 2 = >10%<30% of total supply or <10% & other supplies impacted.
- 3 = >30%<50% of total supply and no other supplies impacted.
- 4 = >30%<50% of total supply and other supplies impacted.
- 5 = ≥50% of total supply.

A.2. : PUBLIC WATER SUPPLY - DEGREE of USE IMPAIRMENT

- 0 = NOT APPLICABLE, No impairment.
- 1 = DEQ preliminary data indicates possible exceedance of human health criteria and/or degraded water quality impairs treatability.
- 2 = VDH warning issued to limit consumption and/or DEQ data confirmed exceeding human health criteria.
- 3 = Suspension of use as PWS ≥ 7<30 days during any 12 month period or Included on 303d listing as threatened for PWS use.
- 4 = VDH advisory issued limiting consumption, and/or suspension of use as PWS ≥ 30 days during any 12 month period.
- 5 = Suspension of use as PWS > 60 days during any 12 month period or Included on 303d listing as impaired.

A.3. : PUBLIC WATER SUPPLY - PROBLEM IDENTIFICATION STATUS

- 0 = NOT APPLICABLE, No water supply use impairment.
- 1 = No data collected to date but strong potential for impairment to water supply use.
- 2 = Complaint info. or minimal data collected indicating strong potential for impairment.
- 3 = Included on 303d listing as threatened or sufficient information indicating impairment.
- 4 = Included on 303d listing as impaired or sufficient data to confirm impairment.
- 5 = Criteria #4 and ID of cause of impairment.

A.4. : PUBLIC WATER SUPPLY - PROBABILITY to CONTROL PROBLEM

- 0 = NOT APPLICABLE, No water supply use impairment.
- 1 = Very low probability (considered none) to control problem.
- 2 = Low probability of control, technology does not exist, extremely difficult to apply existing technology, undefined NPS causes.
- 3 = Moderate probability of control, TMDL scheduled for development, technology exists, difficult/impractical to apply existing technology.
- 4 = High probability of control, TMDL scheduled within 5 yrs., technology applied successfully elsewhere.
- 5 = Control mechanism in development with high probability of control .

A.5. : PUBLIC WATER SUPPLY - URGENCY to ADDRESS PROBLEM

- 0 = NOT APPLICABLE, No water supply use impairment.
- 1 = Very low/no urgency, not listed as impaired (303d), no significant impacts of impairment, no outside motivation.
- 2 = Low urgency for control, listed as threatened (303d), possible significant impacts of impairment not yet experienced, no outside motivation.
- 3 = Moderate urgency for control, TMDL scheduled for development, significant impacts of impairment not yet experienced, outside motivation/public requests.
- 4 = High urgency for control, TMDL scheduled within 3 yrs., significant impacts of impairment infrequently experienced, outside motivation/public requests reaching executive mgmt. levels.
- 5 = Control needed \leq one year, significant health effects other significant impacts to community due to impairment.

HUMAN CONSUMPTION of FISH/BIOTA

B.1. : HUMAN CONSUMPTION of FISH/BIOTA - RESOURCE VALUE IMPORTANCE

- 0 = NOT APPLICABLE, No known human consumption of fish/biota from lake or human consumption of fish/biota prohibited and prohibition for human consumption of fish/biota not due to contamination.
- 1 = Minimal human consumption of fish/biota species.
- 2 = Moderate human consumption of fish/biota species.
- 3 = Significant human consumption of fish/biota species.
- 4 = Fish/biota comprise irreplaceable segment of communities? food supply.

B.2. : HUMAN CONSUMPTION of FISH/BIOTA - DEGREE of USE IMPAIRMENT

- 0 = NOT APPLICABLE, No known impairment of human consumption of fish/biota from lake or human consumption of fish/biota prohibited not due to contamination.
- 1 = Infrequent and temporary loss of resource use primarily due to non-anthropogenic causes.
- 2 = DEQ preliminary data indicates possible exceedance of human health criteria.
- 3 = VDH advisory issued limiting consumption for portion of the population, or suspension of use <30 days during any 12 month period or DEQ data confirms exceedance of FDA criteria.
- 4 = VDH advisory issued limiting consumption for entirety of the population, suspension of use \geq 30 days during any 12 month period or Included on 303d listing as impaired and cause due to presence of human health toxics.
- 5 = Suspension of primary contact use > 60 days during any 6 month period or data confirms persistent exceedances of human health toxics criteria.

B.3. : HUMAN CONSUMPTION of FISH/BIOTA - PROBLEM IDENTIFICATION STATUS

- 0 = NOT APPLICABLE, No impairment to human consumption of fish/biota.
- 1 = No data collected to date but strong potential for impairment to human consumption of fish/biota.
- 2 = Complaint info. or minimal data collected indicating strong potential for impairment to human consumption of fish/biota.
- 3 = Included on 303d listing as threatened or sufficient information indicating impairment.
- 4 = Included on 303d listing as impaired or sufficient data to confirm impairment.
- 5 = Criteria #4 and ID of cause of impairment.

B.4. : HUMAN CONSUMPTION of FISH/BIOTA - PROBABILITY to CONTROL PROBLEM

- 0 = NOT APPLICABLE, No impairment to human consumption of fish/biota.
- 1 = Very low probability (considered none) to control problem.
- 2 = Low probability of control, technology does not exist, extremely difficult to apply existing technology, undefined NPS causes.
- 3 = Moderate probability of control, TMDL scheduled for development, technology exists, difficult/impractical to apply existing technology.
- 4 = High probability of control, TMDL scheduled within 5 yrs., technology applied successfully elsewhere.
- 5 = Control mechanism in development with high probability of control .

B.5. : HUMAN CONSUMPTION of FISH/BIOTA - URGENCY to ADDRESS PROBLEM

- 0 = NOT APPLICABLE, No impairment to human consumption of fish/biota.
- 1 = Very low/no urgency, not listed as threatened (303d), no significant impacts of impairment, no outside motivation.
- 2 = Low urgency for control, listed as threatened (303d), possible significant impacts of impairment not yet experienced, no outside motivation.
- 3 = Moderate urgency for control, TMDL scheduled for development, significant impacts of impairment not yet experienced, outside motivation/public requests.
- 4 = High urgency for control, TMDL scheduled within 3 yrs., significant impacts of impairment infrequently experienced, outside motivation/public requests reaching executive mgmt. levels.
- 5 = Control needed \leq one year, significant health effects or other significant impacts to community due to impairment.

PRIMARY CONTACT (Swimming)

C.1. : PRIMARY CONTACT (Swimming) - RESOURCE VALUE IMPORTANCE

- 0 = NOT APPLICABLE, No known primary contact occurs or primary contact prohibited and is not due to contamination by indicators/pathogens.
- 1 = Primary contact not prohibited, no swimming areas designated, conditions not conducive to swimming, no data primary contact occurs.
- 2 = Minimal primary contact occurs, no swimming areas designated, conditions sporadically support swimming, information that primary contact occurs occasionally.
- 3 = Moderate primary contact occurs, few swimming areas designated, conditions usually support swimming, information that primary contact occurs seasonally.
- 4 = Significant primary contact occurs, multiple swimming areas designated, conditions support swimming, information that primary contact occurs regularly.
- 5 = Significant primary contact resource, area important recreational swimming resource, multiple swimming areas designated, loss of primary contact resource would be irreplaceable.

C.2. : PRIMARY CONTACT (Swimming) - DEGREE of USE IMPAIRMENT

- 0 = NOT APPLICABLE, No impairment or no known primary contact occurs.
- 1 = Infrequent and temporary loss of primary contact use primarily due to non-anthropogenic causes.
- 2 = VDH warning issued to limit primary contact during infrequent periods, suspension of use for primary contact ≥ 7 days during any 12 month period, or Included on 303d listing as threatened for fecal coliform contamination.
- 3 = VDH advisory issued limiting primary contact for portion of the population, suspension of primary contact use $>7<30$ days during any 12 month period or Included on 303d listing as impaired.
- 4 = VDH advisory issued limiting primary contact for entirety of the population, suspension of primary contact use ≥ 30 days during any 12 month period or Included on 303d listing as impaired and cause due to presence of human pathogens.
- 5 = Suspension of primary contact use > 60 days during any 6 month period or persistent source of human pathogens established.

C.3. : PRIMARY CONTACT (Swimming) - PROBLEM IDENTIFICATION STATUS

- 0 = NOT APPLICABLE, no impairment or no known primary contact occurs.
- 1 = No data collected to date but strong potential for impairment primary contact use.
- 2 = Complaint info. or minimal data collected indicating strong potential for impairment.
- 3 = Included on 303d listing as threatened or sufficient information indicating impairment, documented incidence of human illness due to primary contact .
- 4 = Included on 303d listing as impaired, sufficient data to confirm impairment, or multiple incidences of human illness due to primary contact.
- 5 = Criteria #4 and ID of cause of impairment.

C.4. : PRIMARY CONTACT (Swimming) - PROBABILITY to CONTROL PROBLEM

- 0 = NOT APPLICABLE, no impairment or no known primary contact occurs.
- 1 = Very low probability (considered none) to control problem.
- 2 = Low probability of control, technology does not exist, extremely difficult to apply existing technology, undefined NPS causes.
- 3 = Moderate probability of control, TMDL scheduled for development, technology exists, good potential to apply existing technology, defined NPS causes.
- 4 = High probability of control, TMDL scheduled within 5 yrs., technology applied successfully elsewhere.
- 5 = Control mechanism in development with high probability of control .

C.5. : PRIMARY CONTACT (Swimming) - URGENCY to ADDRESS PROBLEM

- 0 = NOT APPLICABLE, no impairment or no known primary contact occurs.
- 1 = Very low/no urgency, not listed as threatened (303d), no significant impacts of impairment, no outside motivation.
- 2 = Low urgency for control, listed as threatened (303d), possible significant impacts of impairment not yet experienced, no outside motivation.
- 3 = Moderate urgency for control, TMDL scheduled for development, significant impacts of impairment not yet experienced, outside motivation/public requests.
- 4 = High urgency for control, TMDL scheduled within 3 yrs., significant impacts of impairment infrequently experienced, outside motivation/public requests reaching executive mgmt. levels.
- 5 = Control needed \leq one year, significant health effects or other significant impacts to community due to impairment.

AQUATIC LIFE PROTECTION

D.1. : AQUATIC LIFE PROTECTION - RESOURCE VALUE IMPORTANCE

- 0 = NOT APPLICABLE, (ONLY CIRCUMSTANCE I CAN CONCEIVE IS WHERE THIS USE HAS BEEN REMOVED IN THE WQS).
- 1 = Small/shallow warm water areas with little fishing pressure, natural conditions not conducive to significant aquatic life populations.
- 2 = Minimally significant aquatic life populations, some mixed stream areas present, natural conditions do not support significant spawning/nursery, no significant commercial or recreational fishing, no endangered, threatened, or ?special interest? species.
- 3 = Moderately significant aquatic life populations, natural conditions would support significant spawning/nursery, moderately significant commercial or recreational fishing, no endangered, threatened, or ?special interest? species, information of significant aquatic populations occurs seasonally.
- 4 = Significant aquatic life populations, natural conditions have historically supported significant spawning/nursery, significant commercial or recreational fishing, few number or few members of endangered, threatened, or ?special interest? species, cold water fishing Class V or VI waters.
- 5 = Significant aquatic life populations, established as a significant spawning/nursery, renowned commercial or recreational fishing, many number or many members of endangered, threatened, or ?special interest? species, cold water fishing Class V or VI, or Tier 3 waters, loss of aquatic life populations resource would be irreplaceable.

D.2. : AQUATIC LIFE PROTECTION - DEGREE of USE IMPAIRMENT

- 0 = NOT APPLICABLE (WHERE THIS USE HAS BEEN REMOVED IN THE WQS), or no known impairment.
- 1 = Impairment not due to anthropogenic causes, natural conditions not conducive to significant aquatic life populations.
- 2 = Minimally significant anthropogenic impairment, combination with #1, benthic monitoring rating Good-Fair (slight impairment), slight reductions in aquatic life population densities or diversity.
- 3 = Moderately significant anthropogenic impairment, benthic monitoring rating Fair or Fair-Poor (moderate impairment) but not identified on 303d listing, identifiable reductions in aquatic life population densities or diversity.
- 4 = Significant anthropogenic impairment, benthic monitoring rating Fair or Fair-Poor (moderate impairment) and IS identified on current 303d listing, identifiable reductions in aquatic life population densities or diversity which has effect on aquatic community.
- 5 = Severe anthropogenic impairment, benthic monitoring rating Poor (severe impairment) and IS identified on current 303d listing, identifiable reductions in aquatic life population densities or diversity which has irreplaceable/permanent effect on aquatic community.

D.3. : AQUATIC LIFE PROTECTION - PROBLEM IDENTIFICATION STATUS

- 0 = NOT APPLICABLE, No impairment to fish/biota.
- 1 = No data collected to date but potential for impairment to aquatic community.
- 2 = Complaint info. or minimal data collected indicating potential for impairment to aquatic community.
- 3 = Included on 303d listing as threatened or sufficient information indicating impairment.
- 4 = Included on 303d listing as impaired or sufficient data to confirm impairment.
- 5 = Criteria #4 and ID of cause of impairment.

D.4. : AQUATIC LIFE PROTECTION - PROBABILITY to CONTROL PROBLEM

- 0 = NOT APPLICABLE, no impairment.
- 1 = Very low probability (considered none) to control problem.
- 2 = Low probability of control, technology does not exist, extremely difficult to apply existing technology, undefined NPS causes.
- 3 = Moderate probability of control, TMDL scheduled for development, technology exists, good potential to apply existing technology, defined NPS causes.
- 4 = High probability of control, TMDL scheduled within 5 yrs., technology applied successfully elsewhere.
- 5 = Control mechanism in development with high probability of control .

D.5. : AQUATIC LIFE PROTECTION - URGENCY to ADDRESS PROBLEM

- 0 = NOT APPLICABLE, no impairment or aquatic life resource does not apply.
- 1 = Very low/no urgency, not listed as threatened (303d), no significant impacts of impairment, no outside motivation.
- 2 = Low urgency for control, listed as threatened (303d), possible significant impacts of impairment not yet experienced, no outside motivation.
- 3 = Moderate urgency for control, TMDL scheduled for development, significant impacts of impairment not yet experienced, outside motivation/public requests.
- 4 = High urgency for control, TMDL scheduled within 3 yrs., significant impacts of impairment infrequently experienced, outside motivation/public requests reaching executive mgmt. levels.
- 5 = Control needed \leq one year, significant health effects or other significant impacts to community due to impairment.

BOATING/RECREATION ACTIVITY

E.1. : BOATING/RECREATION ACTIVITY - RESOURCE VALUE IMPORTANCE

- 0 = NOT APPLICABLE, No known boating/recreation activity occurs due to no accessibility or activity is prohibited and is not due to anthropogenic activity.
- 1 = Small/shallow water areas with little boating/recreation activity , natural conditions not conducive to significant boating/recreation activity .
- 2 = Minimally significant boating/recreation activity, some mixed stream areas present, occasionally natural conditions do not support boating/recreation activity, waters not identified to support boating/recreation activity, minimal public access allowed.
- 3 = Moderately significant boating/recreation activity, natural conditions would usually support significant boating/recreation activity, moderate public access allowed, moderate boating/recreation activity occurs seasonally.
- 4 = Significant boating/recreation activity, natural conditions have historically supported significant boating/recreation activity, public access allowed at multiple locations and/or waterside parks provided, boating/recreation activity routinely scheduled for these waters, boating/recreation activity occurs > six months during a year.
- 5 = Significant boating/recreation activity, established as a significant/renowned area of boating/recreation activity, large scale boating/recreation activity routinely scheduled for these waters, loss of resource would be irreplaceable.

E.2. : BOATING/RECREATION ACTIVITY - DEGREE of USE IMPAIRMENT

- 0 = NOT APPLICABLE, no known impairment.
- 1 = Impairment not due to anthropogenic causes, natural conditions not conducive to boating/recreation activity.
- 2 = Minimally significant anthropogenic impairment to boating/recreation activity, combination with #1.
- 3 = Moderately significant anthropogenic impairment to boating/recreation activity, impairment to portion of the user community.
- 4 = Significant anthropogenic impairment to boating/recreation activity, impairment to majority of the user community, identifiable reductions in use by boating/recreation community.
- 5 = Severe anthropogenic impairment to boating/recreation activity, impairment to all but minority of the user community, identifiable reductions in use by boating/recreation community which has irreplaceable/permanent effect on user community.

E.3. : BOATING/RECREATION ACTIVITY - PROBLEM IDENTIFICATION STATUS

- 0 = NOT APPLICABLE, No impairment to boating/recreation activity.
- 1 = No data collected to date but strong potential for impairment to boating/recreation activity.
- 2 = Complaint info. or minimal data collected indicating strong potential for impairment to boating/recreation activity.
- 3 = Confirming studies completed or sufficient information indicating impairment to boating/recreation activity.
- 4 = Confirming studies completed indicating causes of impairment or sufficient data to confirm impairment boating/recreation activity.
- 5 = Criteria #4 and ID of remedial actions to remove impairment to boating/recreation activity.

E.4. : BOATING/RECREATION ACTIVITY - PROBABILITY to CONTROL PROBLEM

- 0 = NOT APPLICABLE, no impairment to boating/recreation activity.
- 1 = Very low probability (considered none) to control problem.
- 2 = Low probability of control, technology does not exist, extremely difficult to apply existing technology, undefined NPS causes.
- 3 = Moderate probability of control, TMDL scheduled for development, technology exists, good potential to apply existing technology, defined NPS causes.
- 4 = High probability of control, TMDL scheduled within 5 yrs., technology applied successfully elsewhere.
- 5 = Control mechanism in development with high probability of control .

BOATING/RECREATION ACTIVITY

E.5. : BOATING/RECREATION ACTIVITY - URGENCY to ADDRESS PROBLEM

- 0 = NOT APPLICABLE, no impairment to boating/recreation activity or resource does not apply.
- 1 = Very low/no urgency, no significant impacts of impairment, no outside motivation.
- 2 = Low urgency for control, possible significant impacts of impairment not yet experienced, no outside motivation.
- 3 = Moderate urgency for control, significant impacts of impairment not yet experienced, outside motivation/public requests.
- 4 = High urgency for control, remediation activities are scheduled within 3 yrs., significant impacts of impairment infrequently experienced, outside motivation/public requests for remediation reaching executive mgmt. levels.
- 5 = Control needed \leq one year, significant health effects or other significant impacts to community due to impairment.

LAKES PRIORITIZATION
DRAFT RANKING PROCEDURE

LAKE ASSESSED: _____

	RESOURCE VALUE IMPORTANCE	DEGREE of USE IMPAIRMENT	PROBLEM ID STATUS	PROBABILITY to CONTROL PROBLEM	URGENCY to ADDRESS PROBLEM	TOTALS
PUBLIC WATER SUPPLY	5 x = A.1.	5 x = A.2.	2 x = A.3.	2 x = A.4.	5 x = A.5.	
HUMAN CONSUMPTION FISH/BIOTA	5 x = B.1.	2 x = B.2.	2 x = B.3.	2 x = B.4.	5 x = B.5.	
PRIMARY CONTACT (Swimming)	2 x = C.1.	2 x = C.2.	2 x = C.3.	2 x = C.4.	5 x = C.5.	
AQUATIC LIFE PROTECTION	2 x = D.1.	2 x = D.2.	2 x = D.3.	2 x = D.4.	2 x = D.5.	
BOATING/ RECREATION ACTIVITY	1 x = E.1.	1 x = E.2.	1 x = E.3.	1 x = E.4.	1 x = E.5.	
					PRIORITY TOTAL =	

RANKING RATIONALE/COMMENTS: